

Field of the Invention

The present invention relates to a tool for piercing nuts according to the preamble to claim 1.

Background Art

Fig. 1 illustrates a prior art tool for piercing nuts which is adapted to fasten piercing nuts to metal sheet. This requires great accuracy for the nut or metal sheet not to be damaged and for the nut to be safely permanently connected to the metal sheet. A condition for such accuracy is that the punch of the tool for piercing nuts bottoms with the correct pressure against the piercing nut, i. e. that the stroke of the punch is correctly set for the used piercing nut and the metal sheet in question. To achieve this accuracy within some tenths of a millimetre, spacers, or shims, are currently used for adjustment in the shown prior art tool for piercing nuts. The shims are arranged between an adjusting plate and the tool for piercing nuts which thus is moved in its entirety by means of the shims. This mode of operation is time consuming and still does not provide exact information about the pressure to which the piercing nut and the metal sheet are subjected. A negative effect on, for instance, the strength of the piercing nut owing to a punch pressure which after all is incorrect, thus cannot be excluded.

Moreover, it is necessary to completely stop the use of the tool for piercing nuts during the actual adjustment, which causes expensive production standstill when the tool is included as one of a plurality of tools in a long press line.

### Object of the Invention

Therefore, an object of the present invention is to eliminate the drawbacks of the prior art tool for piercing nuts.

### Summary of Invention

According to the invention, this object is achieved by a tool for piercing nuts according to claim 1.

### Brief Description of the Drawings

The invention will now be described in more detail with reference to the accompanying drawings, in which Fig. 1 illustrates a prior art tool for piercing nuts; Fig. 2 is a side view of a gas spring; Fig. 3 is a top plan view of the gas spring; Fig. 4 is a sectional view of the gas spring; Fig. 5 is a side view of the gas spring mounted in a tool for piercing nuts according to the invention; and Fig. 6 is a top plan view of the tool for piercing nuts according to the invention.

### Description of a Preferred Embodiment

In the tool for piercing nuts according to the invention, the shims 1, mentioned by way of introduction, of the prior art tool for piercing nuts 2 in Fig. 1 are replaced by a gas spring 3. The gas spring is shown in more detail in Figs 2-4 and in its position of operation in a tool for piercing nuts 4 according to the invention in Figs 5-6.

The gas spring 3 comprises, as will be seen, three pistons 5-7 which are movably arranged in a cylinder 8-10 each. The cylinders 8-10 are in a manner not illustrated in detail connected with each other (connected in series) to be able to be pressurised by a common source of compressed air (not shown). This source of compressed air makes it possible to set in the cylinders 8-10 a pressure acting on the pistons 5-7 with a force that is suitable for the case of operation in question.

The advantage of the gas spring 3 is that it makes it possible to exactly adjust the pressure exerted upon a piercing nut by the tool for piercing nuts 4. It will be appreciated that the pressure exerted by the gas spring 3 is dependent not only by the actual gas pressure but also by the surface area of the pistons 5-7. It will also be appreciated that the gas spring 3, when the tool for piercing nuts 4 bottoms when fastening a piercing nut, can perform a certain damping motion, the size of which greatly exceeds the damping motion which is allowed by the prior art shims (about 1.5 mm against about 0.1 mm).

Owing to the invention, just a single initial adjustment is therefore necessary, and subsequently appearing minor deviations will not be important since they can be compensated for by the gas spring 3.

The maximum stroke of the pistons 5-7 of the shown gas spring 3 is about 12 mm. This means in practice that not even a case where two piercing nuts inadvertently land on top of each other in the tool for piercing nuts 4 will cause damage that will require stoppage for repair or even, as in the prior art tool for piercing nuts 2 with the shims 1, exchange of the entire tool.

The above-mentioned connection in series of a plurality of cylinders 8-10 renders it possible to make the gas spring 3 elongate so that it well fits the tool for piercing nuts 4 as such and also a press line, in which the tool for piercing nuts 4 can be included as one among a large number of other tools and in which therefore the available space is extremely restricted.

A person skilled in the art understands that the above-described tool for piercing nuts 4 according to the invention can be modified in various ways within the scope of the claims and, for instance, that the number of cylinders 5-7 in the gas spring 3 can be different from the one shown.